THURSDAY, JULY 10, 1902.

THE RECORD OF HUXLEY'S SCIENTIFIC WORK.

The Scientific Memoirs of Thomas Henry Huxley. Vol. iv. Edited by Sir Michael Foster and Prof. E. Ray Lankester. Pp. 689; pls. 28. (London: Macmillan and Co., Ltd., 1902.) Price 30*s.* net.

THE present volume is the fourth of the promised series, and contains a collection of the scientific memoirs, addresses, and reviews, by Huxley, published throughout the period ranging from the early part of the year 1874 until his death. The first item reproduced is that on the skull and heart of Menobranchus, the last the masterly addendum to the life of Richard Owen, with the tenour of which our readers have long been familiar (NATURE, vol. li., p. 169). When it is said that the intervening memoirs include those on "Ceratodus and the Classification of Fishes"; on "The Craniofacial Apparatus of the Lamprey"; on "The Classification and Distribution of the Cray Fishes"; on "The Cranial and Dental Characters of the Canidæ" (with its prophetic passage on the future of the systematist); on "The Application of the Laws of Evolution to the Vertebrata" (than which Huxley never wrote a finer philosophic treatise); on "The Gentians" (which to the systematic botanists, headed by Hooker and the late Prof. Baillon, who heard it read, came as a surprise); and, finally, the last zoological paper which Huxley wrote, "Some further Observations on the Genus Hyperodapedon," it is evident that some of his very best work is in this volume brought before the reader.

By way of general comment, we need only say that the standard of the former volumes, upon which we have more than once passed favourable judgment, has been maintained, except, perhaps, that plates 1 to 3 have suffered somewhat, from the lack of blue-grey colour bestowed upon their originals.

In reviewing the volume which preceded the present one, we took occasion (NATURE, vol. lxiv., p. 76) to comment on the imperfection of the published list which the editors originally caused to be circulated in making their intentions known. We are pleased to find that of the three omissions to which we then more particularly drew attention, two have been made good, chief among them being the Survey memoir on "The Crocodilians of the Elgin Sandstones," which in the present volume monopolises seventeen of the twenty-eight plates provided. One omission upon which we dwelt they have passed over, viz. the Rede lecture on "Animal Forms," delivered at Cambridge in 1883 and duly reported in these columns (NATURE, vol. xxviii. p. 187); and we would remark that, if only on account of the absence of this, the words "THE END" with which the present volume closes cannot mark the completion of the editors' task, if justice is to be done to the life's record in science of the great man whose teachings the memorialists have decided to perpetuate.

To proceed, let it be said that, in addition to the omission just named there are at least six other of Huxley's scientific writings which we consider should have found recognition in the present volume. In seeking comparison with other published works dealing with Huxley's career, we naturally turn to the bibliographic record given in the "Life and Letters" by his son; and there we find duly listed addresses on "The Hypothesis that Animals are Automata and its History" and on "The Geological History of Birds," which our editors have either overlooked or withheld. The latter, a Royal Institution lecture, was first delivered in America and published in full in "American Addresses"; and it is significant that of the five addresses this book contains, the only one the present volume bears (*i.e.* that on "The Study of Biology") was reprinted elsewhere. The address on "Animals as Automata" was reported in NATURE (vol. iv. p. 362), and with elaboration was printed in "Science and Culture," side by side with the article on "Sensation and the Unity of Structure of the Sensiferous Organs," which our editors reproduce. We submit that both it and the three American addresses on "Evolution" should have been included in the present volume, since they give expression to the working of Huxley's mind on the realisation of a complete evolutionary series—*i.e.* the equine. About the Baltimore address, which the "American Addresses" volume also contains, opinions may differ.

Far more serious, however, is the omission, both from its proper place in vol. ii. and from the present volume, of the great Geological Survey memoir (decade xii.) bearing title "Illustrations of the Structure of the Crossopterygian Ganoids," which, with the Rede lecture aforementioned, is not listed in even the "Life and Letters"; and we are at a loss to conceive by what process other than a too exclusive reliance upon the Royal Society Catalogue of Scientific Papers (which for the period concerned is defective) this oversight, resulting in the omission of one of the most important and far-reaching memoirs Huxley ever wrote, can be explained, especially when it is seen that the editors have duly incorporated its preliminary correlate in its proper place.

Nor is this all. Huxley's lecture before the Fisheries Exhibition at Norwich in 1881 is duly reproduced, but why not that of 1883, which marked the opening of the congresses of the Exhibition at South Kensington, perhaps the more important of the two? This omission is the more unfortunate, since, in the hands of Prof. McIntosh, the chief conclusion reached has but lately become the leading theme in rival controversy among fishery experts. And it is pertinent to this to remark that the memoir on the Belemnitidæ, to which we alluded in reviewing vol. iii., and which at the outset escaped recognition, similarly contains the striking observation that the genus Belemnites, if a Decapod, is numerically deficient in "arms," and that this but a month or so ago, in the hands of Huxley's pupil Crick, has led to a startling generalisation, which we can personally confirm.

The editors announced in their original prospectus 151 contributions in all—they have printed 163. In doing so they have shown themselves to have been originally lacking by twelve. We have shown that others have yet to be reprinted, if the work is to be "complete" as was originally resolved, and to depict worthily the scientific labours of the great man whose reputation in the domain

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of "exact science" is (according to our editors' preface) in danger of being underrated.

Moreover, it becomes a question whether the memoir on the "Oceanic Hydrozoa" should not be incorporated, to ensure absolute completeness. We are quite aware that the editors, in their preface, give reasons for excluding this; but we venture to think that if, when they took this step, they had realised the extent of the Survey memoir on the Elgin Crocodiles, and had reflected that the memoir on "The Development of the Elasmobranch Fishes," despite its bulk, was incorporated in the volumes memorialising the late Francis Maitland Balfour, they might perhaps have acted otherwise.

There are thus a possible series of six or seven important scientific communications to be yet reprinted, in order to justify the fulfilment of the memorial. As the matter stands a supplementary volume is imperative, and we leave the plea for it, with respect and full assurance, in the publishers' hands.

The frontispiece to the present volume is a highly successful photographic reproduction of the obverse of the Huxley Memorial Medal. As a likeness it transcends the statue; and it affords us pleasure to remark that the artist (Mr. F. Bowcher) who produced the model is at present engaged upon an enlargement of it, which promises to be even more true to life, and is to be mounted in the Town Hall at Ealing, the place of Huxley's birth. G. B. H.

GEOLOGICAL HISTORY.

History of Geology and Palaeontology to the End of the Nineteenth Century. By Karl Alfred von Zittel. Translated by Maria M. Ogilvie-Gordon., D.Sc. London, Ph.D. Munich. Pp. xiii + 562. (London: Walter Scott, Ltd., 1901.) Price 6*s*.

WHAT may be called the archæological side of the history of this science has been often treated; but what has long been needed is such a history that the serious student can ascertain exactly the position of any branch at the present day, and the more important steps in the advance towards its position. For a task requiring such a wide range of knowledge and such a well-balanced and unbiassed mind there is probably no one better fitted than Prof. von Zittel, while to translate, condense and adapt the work to the needs of British readers has been a congenial duty to one of Zittel's own talented pupils, Mrs. Ogilvie-Gordon.

The author, judging from his preface, is himself in doubt as to the possibility of combining the difficult task of writing a work which will satisfy the specialist and also commend itself to every man of culture. Frankly we think that to do this is impossible; the needs of the two types of readers are so wholly distinct. For even the best class of popular readers something different from the steady and level plod through division after division of the subject is required. There must be what might be called "picture-writing," colour, shading, prominence, gradation, grouping, and above all perspective. Without these the non-technical reader cannot see wood for trees; he has no landings on which to pause for breath, and, worst of all, he hardly realises when he has attained a summit and obtained a view.

But, cutting adrift the man of general culture, what is there here for the specialist? There is a most conscientious, concise, complete, and well-balanced record of the chief steps forward in each of the numerous branches of a complex subject, perfect fairness in the treatment of the different workers and of the claims of various nationalities, a remarkable clearness in indicating the general advance of the science as a whole while treating of its many subdivisions, and a powerful presentment of the significance of the inauguration and final proofs of the chief principles of geology.

About a quarter of the whole work is devoted to geological knowledge in the ages of antiquity, the beginnings of palæontology and geology, and the "heroic age" of geology (1790-1820). Under the first head we read that "fanciful hypotheses and disconnected observations cannot be acknowledged as scientific beginnings of research"; the next stage brings us to the first mineral maps and sections, the earliest ideas of mineral succession, and to primitive opinions about fossils and volcanoes. The "heroic age" was the time of Werner and Hutton, von Buch and Humboldt, Kant and Laplace, Cuvier and Buckland, and above all of William Smith. We are thus brought to the beginning of the nineteenth century, and henceforward we follow the development of the science under the following heads:—Cosmical Geology, Physiographical Geology, Dynamical Geology, Petrography, Palæontology, and Stratigraphical Geology.

The treatment of these branches is singularly even, the weakest, perhaps, being the first and last, while for the strongest it is difficult to choose between the dynamical, petrographic and palæontological sections. The translator has shifted the position of the stratigraphical section and omitted that on topographical geology, we think wisely; and she has also shortened the work, partly by abridgment and partly by omission. This difficult task has been discharged with considerable skill and discretion, though we might, perhaps, be inclined to cavil at some of the omissions; for instance, the suppression of the "kern theory" of Rosenbusch and the rock-formulæ of Michel-Lévy, to note only two examples.

One characteristic of some of the heroes of geology seems not to have died out at the present day. We read that

"It was the spoken word of Werner that carried. Of written words no man of genius could have been more chary. His dislike of writing increased as he grew older, . . ."

Again,

"Hutton's thoughts had been borne in upon him direct from nature; for the best part of his life he had conned them, tossed them in his mind, tested them, and sought repeated confirmation in nature before he had even begun to fix them in written words, or cared to think of anything but his own enjoyment of them."

And once again,

"a dinner was arranged . . . and William Smith *consented to dictate* a table of the British strata from the Carboniferous to the Cretaceous formation."

Zittel is seen at his best when dealing with the classical works of those masters of the science who have given us

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